CLAIMS

What is claimed is:

1. A radioactive seed for use in radiation therapy, the radioactive seed comprising:

a sealed housing having an internal cavity;

at least one carrier body disposed within the cavity for maintaining a radioisotope, as a radiation source, in a distribution along a length of the cavity; and

a plurality of X-ray detectable markers distributed along the length of the cavity, at least two of the X-ray detectable markers being laterally separated from one another by at least one carrier body,

wherein the distribution of the plurality of X-ray markers reveals an orientation of the radioactive seed when the seed is exposed to an X-ray photography.

2. The radioactive seed of claim 1, wherein each of the plurality of X-ray detectable markers has a substantially spherical shape.

3. The radioactive seed of claim 2, wherein the radioactive seed is manufactured by rolling the plurality of X-ray detectable markers into the internal cavity.

4. The radioactive seed of claim 1, wherein the carrier body comprises a plurality of separate carrier units such that each of the separate carrier units is impregnated with the radioisotope.

5. The radioactive seed of claim 4, wherein each of the plurality of separate carrier units is substantially evenly distributed along the length of the cavity so that the seed emits substantially uniform radiation around the housing of the seed.

6. The radioactive seed of claim 4, wherein each of the separate carrier units has a substantially spherical shape.

7. The radioactive seed of claim 6, wherein the radioactive seed is manufactured by rolling the plurality of separate carrier units into the internal cavity to facilitate the manufacturing process.

8. The radioactive seed of claim 4, wherein the plurality of separate carrier units is distributed at one end of the cavity, and the plurality of X-ray detectable markers is distributed at an opposing end of the cavity.

9. The radioactive seed of claim 1, wherein the housing comprises a material selected from a group of titanium, plastic, ceramic and stainless steel.

10. The radioactive seed of claim 1, wherein the radioisotope comprises a material selected from a group of iodine-125 and palladium-103.

11. The radioactive seed of claim 1, wherein the carrier body comprises an ion exchange resin material.

12. A radioactive seed for use in radiation therapy, the radioactive seed comprising:

a sealed housing having an internal cavity;

at least one carrier body disposed within the cavity for maintaining a radioisotope, as a radiation source, in a distribution along a length of the cavity; and

a plurality of X-ray detectable markers distributed along the length of the cavity adjacent the at least one carrier body,

wherein the distribution of the plurality of X-ray markers reveals an orientation of the radioactive seed when the seed is exposed to an X-ray photography, and

wherein each of the plurality of X-ray detectable markers has a hole passing through the marker so that radiation from the radioisotope will pass through the X-ray detectable markers.

13. A radioactive seed for use in radiation therapy, the radioactive seed comprising:

a sealed container having a cavity;

a plurality of carriers substantially evenly distributed and laterally spaced along the length of the cavity, each of the plurality of carriers containing and maintaining a radioisotope as a radiation source; and

a plurality of X-ray detectable markers distributed among the carriers such that the distribution of the markers discloses the orientation of the seed when the seed is exposed to X-ray photography,

wherein at least two of the X-ray detectable markers are laterally separated from one another by a carrier.

14. A radioactive seed for use in radiation therapy, the radioactive seed comprising:

a sealed housing having an external surface and an internal cavity;

at least one carrier body disposed within the cavity for maintaining a radioisotope, as a radiation source, in a distribution along a length of the cavity; and

an X-ray detectable marker disposed on and wrapped around the external surface of the housing in a spiral pattern.

15. The radioactive seed of claim 13, wherein the X-ray detectable marker discloses the orientation and the location of the seed when the seed is exposed to X-ray photography.

16. The radioactive seed according to claim 1, wherein uniformity of radiation emitted from the housing is only slightly effected by the distribution of the plurality of X-ray detectable markers.

17. The radioactive seed according to claim 13, wherein uniformity of radiation emitted from the housing is only slightly effected by the distribution of the plurality of X-ray detectable markers.

18. A radioactive seed for use in radiation therapy, the radioactive seed comprising:

a sealed housing having an internal cavity;

at least one carrier body disposed within the cavity for maintaining a radioisotope, as a radiation source, in a distribution along a length of the cavity; and

a plurality of X-ray detectable markers distributed along the length of the cavity, at least two of the X-ray detectable markers being adjacent to one another,

wherein the distribution of the plurality of X-ray markers reveals an orientation of the radioactive seed when the seed is exposed to an X-ray photography.

19. A radioactive seed for use in radiation therapy, the radioactive seed comprising:

a sealed container having a cavity;

a plurality of carriers substantially evenly distributed and laterally spaced along the length of the cavity, each of the plurality of carriers containing and maintaining a radioisotope as a radiation source; and

a plurality of X-ray detectable markers distributed among the carriers such that the distribution of the markers discloses the orientation of the seed when the seed is exposed to X-ray photography,

wherein at least two of the X-ray detectable markers are adjacent to one another.

20. A method of treating an affected region of diseased tissue in a patient, the method comprising:

implanting a plurality of first radioactive seeds in the affected region, each of the first radioactive seeds having a sealed housing with an internal cavity, at least one carrier body disposed within the cavity for maintaining a first radioisotope source at a first dosage and a plurality of X-ray detectable markers placed along a length of the cavity in a first configuration;

implanting a plurality of second radioactive seeds in the affected region, each of the second radioactive seeds having a sealed housing with an internal cavity, at least one carrier body disposed within the cavity for maintaining a second radioisotope source at a second dosage and a plurality of X-ray detectable markers placed along a length of the cavity in a second configuration distinguishable from the first configuration;

generating an X-ray image of the affected region including the first and second radioactive seeds implanted therein, the X-ray image providing representations of the first and second configurations which are visibly distinguishable; and

associating each representation of the first configuration with a seed having one of the first radioisotope source and the first dosage, and associating each representation of the second configuration with a seed having one of the second radioisotope source and the second dosage.

21. The method of claim 20, the method further comprising:

selecting the first radioisotope source to comprise a material including palladium-103 and the second radioisotope to comprise a material including iodine-125; and

determining a distribution of palladium 103 dosages in the affected region based upon locations of the representations of the first configuration in the X-ray image, and a distribution of the iodine 125 in the affected region based upon locations of the representations of the second configuration in the X-ray image.

22. The method of claim 20, the method further comprising:

selecting the first dosage to be greater than the second dosage; and

determining a distribution of the dosage in the affected region by associating each location of a representation of the first configuration in the X-ray image with a seed having the first dosage and associating each representation of the second configuration in the X-ray image with a seed having the second dosage.

23. A radioactive seed for use in radiation therapy, the radioactive seed comprising:

a sealed housing having an internal cavity;

at least one carrier body disposed within the cavity for maintaining a particular radioisotope, as a radiation source, in a distribution along a length of the cavity; and

a plurality of X-ray detectable markers distributed along the length of the cavity in a configuration which is representative of the particular radioisotope source,

wherein the configuration of the plurality of X-ray markers visibly identifies the particular radioisotope source of the radioactive seed when the seed is exposed to X-ray photography.

24. The radioactive seed of claim 23, wherein the particular radioisotope source is a material selected as including one of iodine-125 and palladium-103.

25. The radioactive seed of claim 23, wherein at least two of the X-ray markers are adjacent to one another.

26. The radioactive seed of claim 23, wherein at least two of the X-ray markers are laterally separated from one another.

27. A radioactive seed for use in radiation therapy, the radioactive seed comprising:

a sealed housing having an internal cavity;

at least one carrier body disposed within the cavity for maintaining a radioisotope, as a radiation source at a particular dosage level, in a distribution along a length of the cavity; and

a plurality of X-ray detectable markers distributed along the length of the cavity in a configuration which is representative of the particular dosage level,

wherein the configuration of the plurality of X-ray markers visibly identifies the particular dosage level of the radioactive seed when the seed is exposed to X-ray photography.

28. The radioactive seed of claim 27, the wherein at least two of the X-ray markers are adjacent to one another.

29. The radioactive seed of claim 27, wherein at least two of the X-ray markers are laterally separated from one another.